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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/083,756	02/25/2002	Do-Hyung Kim	4591-227	2262

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EXAMINER

VU, QUANG D

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/083,756

Applicant(s)

KIM ET AL.

Examiner

Quang D Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 27-28 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-14 is/are allowed.
- 6) ☒ Claim(s) 15-18 and 22 is/are rejected.
- 7) ☒ Claim(s) 19-21 and 23-26 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-26, drawn to a method for forming an oxide layer in an integrated circuit device, classified in class 438, subclass 424.
- II. Claims 27-28, drawn to a trench isolation structure, classified in class 257, subclass 510.

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the device of group II invention could be made by as a materially different process. For example, the thermal oxide layer and the CVD material layer can be formed by different methods, instead of forming the thermal oxide layer and the CVD material layer in the CVD apparatus.

Because these inventions are distinct for the reasons given above and have acquired separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversion with Alan McCollom on 09/16/02 as provisional election was made without traverse to prosecute the invention of group I, claims 1-26. Affirmation of this election must be made by application in replying to this Office action. Claims 27-28 are

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withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The specification never discloses forming a trench filling layer on the nitride liner in the CVD apparatus to a thickness of approximately 3000 angstroms to 10000 angstroms as claimed in claim 11.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 15-18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,180,493 to Chu.

Regarding claim 15, Chu (figures 2A-G) teaches a method of forming a layer for an integrated circuit device, comprising:

forming a trench (208) in a silicon substrate (200) by etching;

forming an oxide layer (210) on a surface of the trench (208);

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forming a conformal liner material layer (212) on the thermal oxide layer (210); and
forming a nitride liner layer (214) on the conformal liner material layer (212).

It is inherent that the oxide layer (210) is a thermal oxide layer because the oxide layer is formed by an oxidation process carried out in an oxygen-filled atmosphere at a high temperature.

Chu differs from the claimed invention by not showing a single crystalline silicon substrate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a single crystalline silicon substrate because it has high electron mobility.

Regarding claim 16, Chu differs from the claimed invention by not showing the thermal oxide layer is formed to a thickness of 20 angstroms to 100 angstroms. It would have been obvious to one having ordinary skill in the art at the time the invention was made for the thermal oxide layer is formed to a thickness of 20 angstroms to 100 angstroms, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 17, Chu differs from the claimed invention by not showing the liner material layer is formed to a thickness of 50 angstroms to 400 angstroms. It would have been obvious to one having ordinary skill in the art at the time the invention was made for the liner material layer is formed to a thickness of 50 angstroms to 400 angstroms, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 18, Chu teaches the liner material is made of silicon oxide. Chu differs from the claimed invention by not showing the liner material layer is made of silicon dioxide. It

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would have been obvious to one having ordinary skill in the art at the time the invention was made for the liner material layer is silicon dioxide, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use. In re Leshin, 125 USPQ 416.

Regarding claim 22, Chu teaches a method of forming an isolation trench, comprising: etching a silicon substrate (200) to form a trench (208) therein; and forming all layers (212, 216), formed in the trench (208), in the trench by atmospheric pressure chemical vapor deposition (APCVD).

It is inherent that both of layers (212, 216) are formed in the same APCVD apparatus because both of them are formed by the APCVD method.

Chu differs from the claimed invention by not showing a single crystalline silicon substrate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a single crystalline silicon substrate because it has high electron mobility.

Allowable Subject Matter

Claims 19-21 and 23-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

3. Claims 1-14 are allowed.

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4. The following is an examiner's statement of reasons for allowance: The most closely related art, US Patent No. 6,180,493 to Chu. Chu does not anticipate or render the claimed invention such as growing a thermal oxide layer on a surface of a semiconductor substrate in a chemical vapor deposition (CVD) apparatus and forming a CVD material layer on the thermal oxide layer in the CVD apparatus.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D Vu whose telephone number is 703-305-3826. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

qv
March 10, 2003

Steven Loh